SOV/137-58-7-14195

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 33(USSR)

AUTHOR: Filippov, I. P.

TITLE: Utilization of the Theory of Similarity for the Description of the Properties of Liquid Metals. Pressure of Saturated Vapors and Heat of Evaporation (Ispol'zovaniye teorii podobiya dlya opisaniya svoystv zhidkikh metallov. Davleniye nasyshchennykh parov i teplota ispareniya)

PERIODICAL: Vestn. Mosk. un-ta. Ser. matem., mekhan., astron., fiz., khimii, 1957, Nr 3, pp 85-88

ABSTRACT: The usual method of application of the theory of similarity in the form of the law of corresponding conditions is not applicable to metallic alloys because of the absence of data on the critical parameters. For metallic alloys, a version of the theory of similarity is worked out, wherein dimensionless criteria which do not contain any empiric parameters are employed. For metals with a dense packing of atoms in the liquid state the following correlation was established: $N = 1.06_3 \log_{10} K + 6.06$ (1) where $K = T\rho/MP$, T is the temperature in ^{o}K, ρ is the density at the given temperature, M is the atomic weight, and P is the

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Utilization of the Theory of Similarity (cont.)

pressure. The relationship between the temperature and the saturated vapor pressure is usually described by the equation: $\log_{10}P = D - (B/T)$ (2). The second member of the right side of equation (2) is determined by equation (1), i.e., $N=(B/T)$. The heat of evaporation l in accordance with equation (2) is calculated from the relationship $l = 4.575$ NB. In view of the minor influence of the magnitude of K on N it is permissible in calculating K to use density and temperature data other than those for which the P is known. Thus, for calculating the values for K, N, B, D, and l it is permissible to use only the data on the boiling temperature and the density of a metal, for instance, at the melting point. An example is given of the calculation of the vapor pressure of Na at different temperatures and of that of the heat of evaporation of Na according to the given boiling point 881°C and ρ 0.93 g/cm^3.

1. Liquid metals--Theory 2. Liquid metals--Properties 3. Vapor pressure--Analysis

I. K.

Card 2/2

Filippov, L.P.

AUTHOR: Filippov, L.P. 120-6-21/36

TITLE: A Variant of the Relative Method of Measuring the Thermal Conductivity of Gases and Liquids (Variant otnositel'nogo metoda izmereniya teploprovodnosti gazov i zhidkostey)

PERIODICAL: Pribory i Tekhnika Eksperimenta, 1957, No.6, pp. 86 - 88 (USSR).

ABSTRACT: The method consists of the following. A thin, platinum wire A (Fig.1), 150 mm long and having a radius of 0.1 mm is placed in a capillary tube B containing the fluid under investigation (radius of capillary equals 1.5 mm). The capillary is surrounded by a thermostatted envelope. The platinum wire is included as one of the arms of a Wheatstone bridge. At a certain driving voltage, the bridge is balanced by adjusting one of the other three resistances. Next, the driving voltage is changed and consequently the bridge becomes unbalanced due to an increase in the temperature of the wire. The off-balanced current and its corresponding driving voltage suffice to determine the thermal conductivity of the fluid surrounding the platinum wire if analogous measurements have been carried out on a substance with a known thermal conductivity. The theory of the method is given and an accuracy of 1 to 2% can be easily obtained. Tests were carried out on CCl_4 and CH_3OH.

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120-6-21/36

A Variant of the Relative Method of Measuring the Thermal Conductivity of Gases and Liquids.

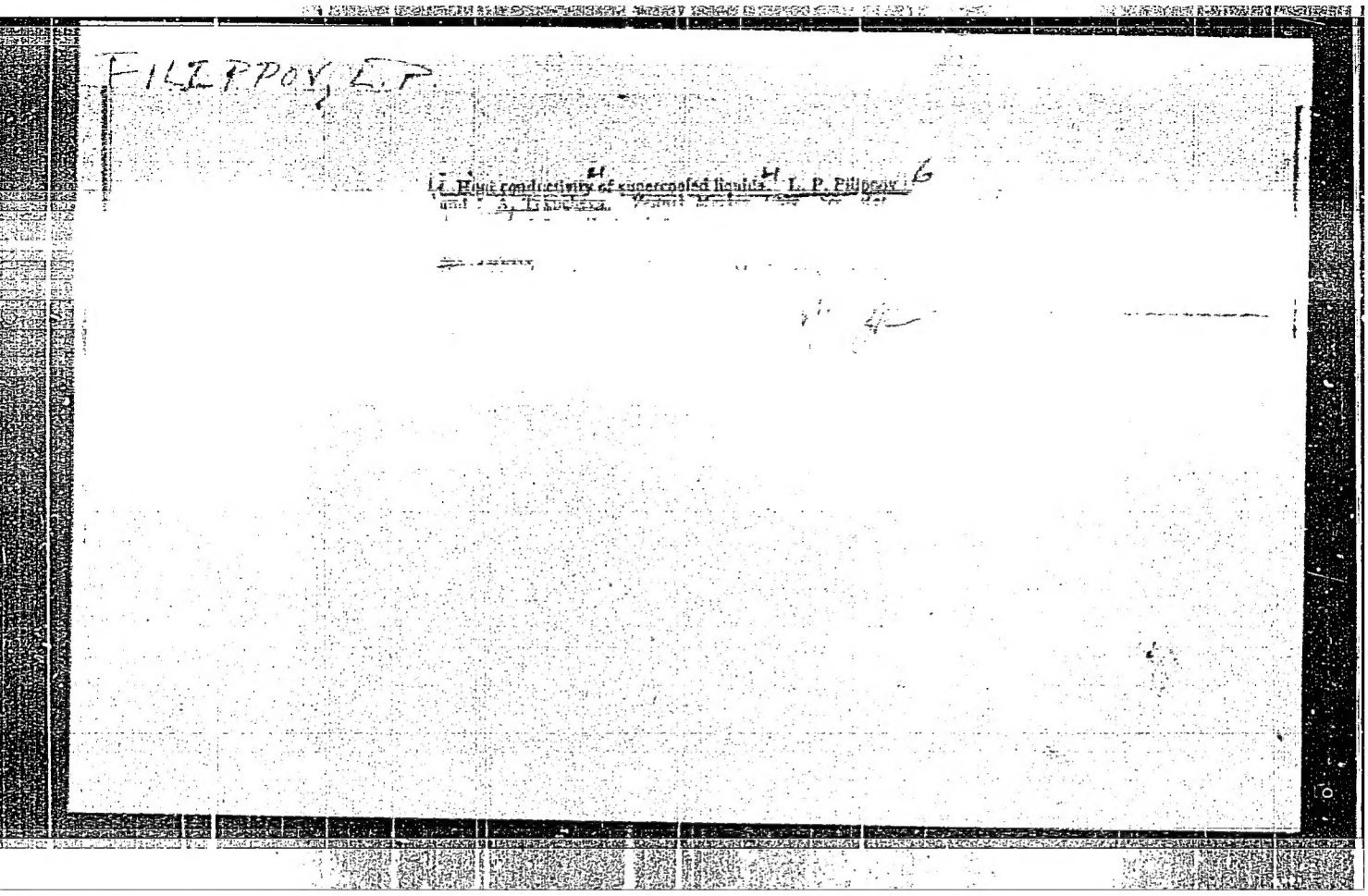
Using toluene as the standard substance, the thermal conductivity of CCl_4 and CH_3OH was found to be 0.086_5 and 0.180, respectively (at 30 °C). This is in good agreement with the data given in Refs. 1 - 16.
There are 2 diagrams, 1 table and 16 references, 8 of which are Slavic.

ASSOCIATION: Department of Physics MGU (Fizicheskiy Fakul'tet MGU)

SUBMITTED: December 12, 1956.

AVAILABLE: Library of Congress.

Card 2/2



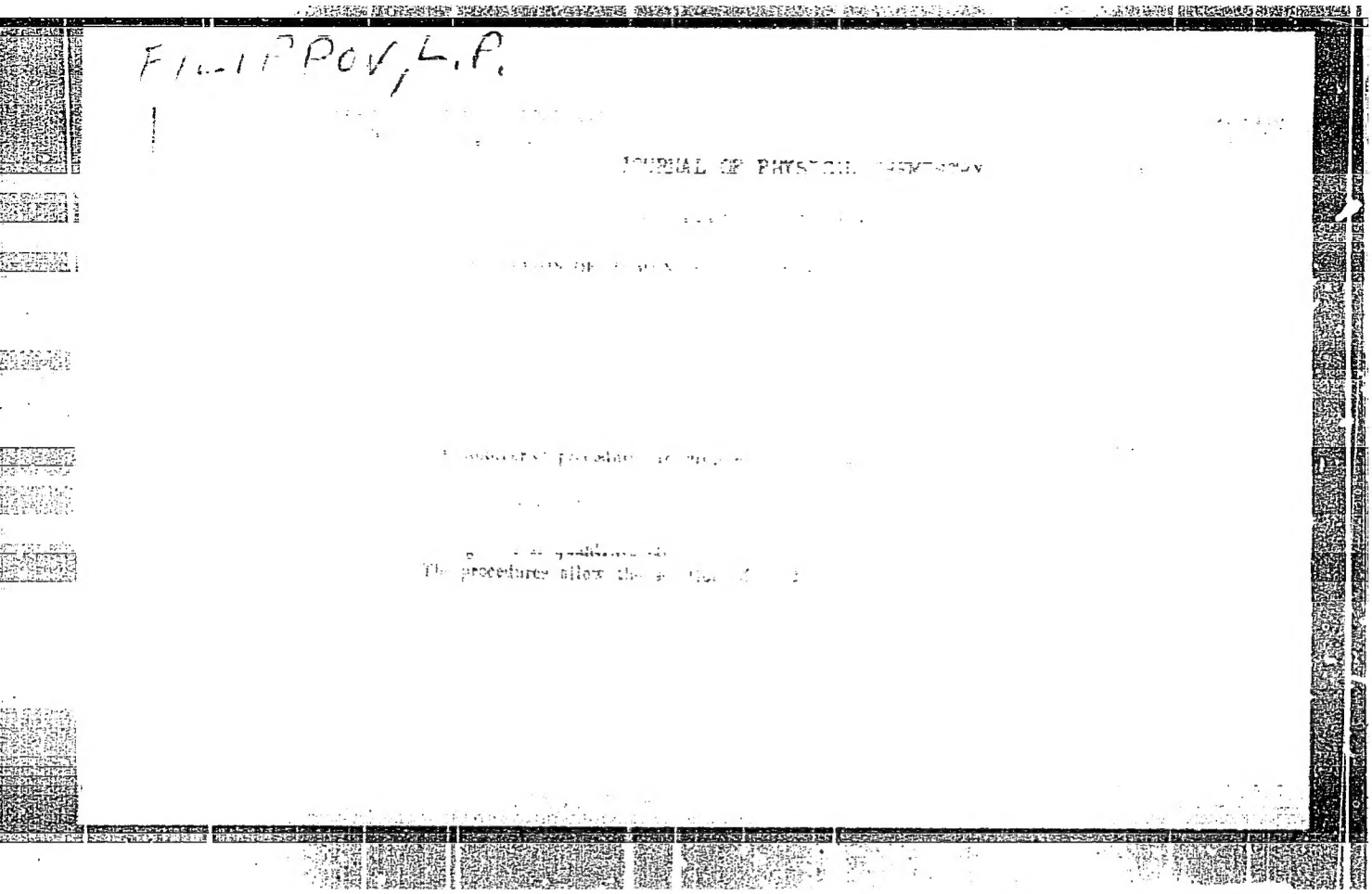
FILIPPOV, E.P.

1. High conductivity of supercooled liquids. L. P. Filippov.

FILIPPOV, L.P.

Theory of similitude as it is applied to discription of properties of liquid metals. Vest. Mosk. un. Ser. mat., mekh., astron. fiz. khim., 12 no.5:81-85 '57. (MIRA 11:9)

1.Kafedra molekulyarnoy fiziki Moskovskogo gosudarstvennogo universiteta.
(Liquid metals) (Dimensional analysis)



Filippov, L.P.

USSR/Atomic and Molecular Physics - Statistical Physics Thermodynamics. D-3

Abs Jour : Ref Zhur - Fizika, No 1, 1958, 733

Author : Filippov, L.P.

Inst : Moscow State University

Title : The Application of Dimensional Analysis to the Description of the Properties of Liquids. II. Extrapolation of the Temperature Relation of Saturated Vapor Pressures and Orthobaric Density.

Orig Pub : Zh. fiz. khimii, 1957, 31, No 5, 1136-1140

Abstract : On the basis of considerations, discussed in the first report (Referat Zhur Fizika, 1957, No 12, 30303), the author proposes a method for calculating the temperature dependence of the pressure of saturated vapors. The calculation requires the knowledge of the pressures at two values of

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USSR/Atomic and Molecular Physics - Statistical Physics Thermodynamics.

Abs Jour : Ref Zhur - Fizika, No 1, 1958, 733

the temperature (in practice, the boiling temperature and one value of the pressure at a lower temperature). The method is suitable for normal organic liquids over the entire range from the melting point to the critical point.

An analogous computation method is proposed for the orthobaric density.

Card 2/2

FILIPPOV, L.P.

Using dimensional analysis to describe the properties of liquids [with summary in English]. Zhur.fiz.khim. 31 no.9:1999-2004 S '57. (MIRA 11:1)

1.Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Liquids) (Vapor pressure) (Vapor density)
(Dimensional analysis)

Filippov, L.P

AUTHOR: Filippov, L.P. 76-11-8/35

TITLE: The Use of the Similarity Theory for the Description of the Properties of Liquids. IV. Viscosity (Ispol'zovaniye teorii podobiya dlya opisaniya svoystv zhidkostey. IV. Vyazkost')

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 11, pp. 2435-2437 (USSR)

ABSTRACT: Considerations mentioned in the author's previous article [Ref.1] are here used for the investigation of the question of the viscosity of normal liquids along the line of saturation. By making use of the results obtained from references 2 and 4, two methods for the calculation of the temperature dependence of viscosity are given. These methods can be applied up to the critical point. In the case of the first method the following initial data apply: Boiling temperature and the value of the pressure of saturated vapors, of the density, and of the viscosity at low temperatures. In the case of the second method two values for density and one value for viscosity at low temperatures are used for purposes of

Card 1/2

The Use of the Similarity Theory for the Description of the Properties of Liquids IV. Viscosity. 76-11-8/35

computation. There are 2 tables and 6 references, 4 of which are Slavic.

ASSOCIATION: Moscow State University imeni M.V.Lomonosov (Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova)

SUBMITTED: May 17, 1956

AVAILABLE: Library of Congress

Card 2/2

FILIPPOV, L.P.; PASHENKOVA, I.G.

Measuring the coefficent of thermal diffusivity for liquids.
Inzh.-fiz.zhur. 1 no.8:84-88 Ag '58. (MIRA 11:8)

1.Gosudarstvennyy universitet im. M.V. Lomonosova, Moskva.
(Thermal diffusivity)

AUTHOR: Filippov, L. P. 76-32-4-4/43

TITLE: The Application of Dimensional Analysis to the Description of the Properties of Liquids (Ispol'zovaniye teorii podobiya dlya opisaniya svoystv zhidkostey) V. On Crystallization Temperature (V. O temperature kristallizatsii)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 760 - 761 (USSR)

ABSTRACT: The quantity γ of the twodimensional equation

$$\gamma = \frac{T_{kr}}{T_{cryst}}$$

is investigated in which case the function of the pressure is neglected. For analogous substances γ must practically be constant while for deviations γ can serve as criterion of determination. The noble gases are mentioned as example which show a relatively small deviation of the value γ. From some considerations follows, however, that with substances of different kind no remarkable correlation exists between the earlier

Card 1/2

The Application of Dimensional Analysis to the Description of the Properties of Liquids. V. On Crystallization Temperature

derived criteria A and B and the criterion γ, but that the latter is independent, so that investigations of the properties of the substances in liquid phase cannot supply any data on crystallization temperature. A diagram of the determinations of the function γ/vs. number of carbon atoms of an homologous series of not ramified, saturated hydrocarbons is mentioned, which shows that the hydrocarbons with an even number of carbon atoms have smaller values for γ than their neighbours with odd numbers of carbon atoms, with the exception of methane which has a value similar to that of noble gases. Investigations of the connection between γ and concrete structural types might be suitable for the determination of the solid phase, according to the knowledge obtained here. There is 1 figure.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)
SUBMITTED: July 3, 1956
AVAILABLE: Library of Congress
Card 2/2 1. Liquids--Properties

AUTHOR: Filippov, L. P. 76-32-5-3/47

TITLE: The Application of the Theory of Similitude for the Description of Liquid Properties (Ispol'zovaniye teorii podobiya dlya opisaniya svoystv zhidkostey)
VI. On the Temperature Dependence of Saturated Vapor Pressures (VI. O temperaturnoy zavisimosti davleniya nasyshchennykh parov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 5, pp. 986-990 (USSR)

ABSTRACT: A modification of the quantity A of the previous works into α is carried out, where $\alpha = 0.598 - \lg A$, and an equation is obtained which can be applied to the modification interval of the criterion to be determined, and which practically comprises all non-dissociable substances for all temperature ranges from the melting point to the critical point. In the application of the equation for practical calculations of the pressure of saturated vapors the critical temperatures and pressures as well as the parameter α must be known, the boiling temperature serving as most favorable starting point for the calculations. As by the mentioned equation a function of the pressure

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The Application of the Theory of Similitude the Description of Liquid Properties. VI. On the Temperature Dependence of Saturated Vapor Pressures

76-32-5-3/47

on the temperature is given the reaction of the associated substances in relation to the investigated function can be observed, on which occasion it is pointed out that the functional dependence $\overline{\Pi} = \overline{\Pi}(A, \overline{b})$ is the same for polar and unpolar liquids; this fact has not been respected sufficiently in the above mentioned works, it is, however, proved by the given equation. A calculation table of the pressures of saturated vapor of ethylacetate is given to illustrate all this, and it is mentioned that the effect of the dipolar interaction of the molecule does not noticeably effect the amount of pressure of saturated vapors, which phenomenon is generalized to the P - V - T ratio of liquids. There are 2 tables and 6 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: July 3, 1956

Card 2/2

1. Liquids--Theory 2. Liquids--Temperature factors
3. Liquids--Vapor pressure 4. Liquids--Mathematical analysis

GOLITSYN, Boris Borisovich [deceased, 1862-1916]; PREDVODITELEV, A.S., otv. red.toma; BOCHKOVSKIY, V.F., prof., red.; GORSHKOV, G.P., prof., red.; KIRNOS, D.P., prof., red.; SAVARENSKIY, Ye.F., prof., red.; SAVARENSKIY, Ye.F., prof., red.; VVEDENSKAYA, A.V., kand.fiz.-mat. nauk, red.; VESHNYAKOV, N.V., kand.fiz.-matem.nauk, red.; LEVITSKAYA, A.Ya., kand.fiz.-matem.nauk, red.; LINDEN, N.A., kand.fiz.-matem. nauk, red.; FILIPPOV, L.P., kand.fiz.-matem.nauk, red.; KHARIN, D.A., kand.fiz.-matem.nauk, red.; ALEKSEYEV, D.M., red.izd-va; MARKOVICH, S.G., tekhn.red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad.nauk SSSR. Vol.1. [Physics] Fizika. 1960. 241 p. (MIRA 13:11)

1.Chlen-korrespondent AN SSSR (for Predvoditelev).
(Physics)

GOLITSYN, Boris Borisovich, akademik; BONCHKOVSKIY, V.F., prof., otv.red.II toma; PREDVODITELEV, A.S., otv.red.I toma; GORSHKOV, G.P., prof., red.; KIRNOS, D.P., prof., red.; SAVARENSKIY, Ye.F., prof., red.; VVEDENSKAYA, A.V., kand.nauk, red.; VESHNYAKOV, N.V., kand.nauk, red.; LEVITSKAYA, A.Y., kand.nauk, red.; LINDEN, N.A., kand.nauk, red.; FILIPPOV, L.P., kand.nauk, red.; KHARIN, D.A., kand.nauk, red.; ALEKSEYEV, D.M., red.izd-va; KASHINA, P.S., tekhn.red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad.nauk SSSR. Vol.2. [Seismology] Seismologiia. 1960. 489 p.
(MIRA 13:12)

1. Chlen-korrespondent AN SSSR (for Predvoditelev).
(Seismology)

85733

S/170/60/003/007/016/018/XX
B019/B067

11.5300

AUTHOR: Filippov, L. P.

TITLE: A Method of Measuring the Coefficient of Thermal Activity of Liquids

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 7, pp. 121 - 123

TEXT: According to A. V. Lykov (Ref. 1), the thermal activity coefficient is given to be $\varkappa = \lambda/\sqrt{a} = \sqrt{\lambda c \varrho}$, where λ is the thermal conduction, a the thermal diffusivity, c the specific heat, and ϱ the density. The principle of the measuring method suggested here consists in the measurement of temperature pulsations of a thin metal foil, heated by means of alternating current, which is placed in the liquid to be investigated. The thermal activity coefficient of the liquid concerned is determined from the amplitude of these pulsations. The following relation is given for the amplitude of temperature pulsations: $\overline{\vartheta} = n(2\varkappa^2 + 2\varkappa b + b^2)^{-1/2}$ (1). Here, $n = q_0/4\sqrt{\omega}$ and $b = c\varrho d\sqrt{\omega}$. The metal foil was connected with a Wheatstone

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A Method of Measuring the Coefficient of Thermal Activity of Liquids

S/170/60/003/007/016/018/XX
B019/B067

bridge during the measurements. The thermal activity coefficient is then obtained from the formula $2\varkappa^2 + 2\varkappa b + b^2 = k^2 y^{-2}$ (3). Here, $y = er_0(R+r_0)E^{-3}$, $k = 0.24Ra/4Ll\omega^{1/2}$, $e = E\alpha Rr_0(R+r_0)^{-2}$. r is the resistance of the foil, E the electrical field strength on the foil (for a frequency equal to ω), and R a series resistance. The method described here is less suited for measuring the absolute value of $\varkappa$; it can, however, well be used for measuring the relative values. Here, b and k can be determined as empirical values during the gaging process. Fig. 1 shows a diagram of the arrangement. L. M. Vozzhennikova thoroughly investigated the operation of the arrangement. There are 1 figure and 1 Soviet reference.

ASSOCIATION: Gosudarstvennyy universitet im. M. V. Lomonosova, g. Moskva (State University imeni M. V. Lomonosov, Moscow)

Card 2/3

S/188/60/000/003/010/011/XX
B004/B064

11,1000

AUTHOR: Filippov, L. P.

TITLE: Thermal Conductivity of Organic Liquids

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 3, fizika, astronomiya, 1960, No. 3, pp. 61-68

TEXT: The author proceeds from the fact that the thermal conductivity measured by various research workers shows considerable deviations. He discusses, above all, the results and methods of L. Riedel (Refs. 1-3) and Bridgman (Ref. 8), and compares them with the results obtained by the Soviet scientists N. B. Vargaftik, V. V. Kerzhentsev, L. P. Filippov, N. V. Tsederberg, V. P. Frontas'yev, and F. G. El'darov. Table 1 gives the data of L. P. Filippov for 41 organic liquids. The author aims at compiling all data available on the thermal conductivity λ of organic liquids, and wants to check the reliability of these data. The criterion chosen is the reciprocal value Δ of the root mean square deviations: $\Delta = 1/\sum(1/\Delta_i^2)$. Table 2 gives the results of evaluation of these data in first, second, and third approximation, which have been obtained by various

Card 1/2

Thermal Conductivity of Organic Liquids S/188/60/000/003/010/011/XX
B004/B064

research workers for methyl alcohol; Table 3 gives λ_{30} and Δ for 150 organic liquids together with references. There are 3 tables and 19 references: 7 Soviet, 6 US, 1 Belgian, and 5 German.

ASSOCIATION: Kafedra molekulyarnoy fiziki
(Chair of Molecular Physics)

SUBMITTED: November 4, 1959

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Card 2/2

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S/188/60/000/004/016/018/XX
B006/B067

AUTHORS: Filippov, L. P., Yershova, N. G., Smirnova, N. N.

TITLE: The Problem of the Change in the Properties of Liquids by Undercooling

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 3, fizika, astronomiya, 1960, No. 4, pp. 21 - 25

TEXT: The authors present the results of measurements of specific heat and thermal conductivity of liquids passing over into the undercooled state. They discuss some results of viscosity measurements made at the kafedra molekulyarnoy fiziki MGU (Chair of Molecular Physics of Moscow State University). S. S. Urazovskiy and I. A. Sidorov studied the temperature dependence of the specific heat of monochloroacetic acid; they observed a distinct peak at the melting point and two peaks at lower temperatures. To determine the specific heat, they measured thermal activity $x = \sqrt{\lambda c \varrho}$, thermal conductivity λ, and density ϱ. The thermal activity coefficient x was measured by a method developed by L.P.Filippov and L. M. Vozzhennikova. The thermal conductivity λ in salol and aceto-

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The Problem of the Change in the Properties of Liquids by Undercooling

S/188/60/000/004/016/018/XX
B006/B067

phenone was measured by a method described in Ref. 9. The measurement results are illustrated in Fig. 1. The functions $\lambda(t)$ proved to be linear. $c_p(t)$ of salol and acetophenone, determined by measuring x and λ, are shown in Figs. 2 and 3. Also these functions have a practically linear course. Although the measurements were made in intervals of only 0.1°, no peak could be observed. L. P. Filippov and I. A. Tekucheva measured $\lambda(t)$ during undercooling, and observed small peaks ($\sim 4\%$) in m-cresol and acetophenone; on more intensive undercooling salol and monochloroacetic acid showed no peaks. Finally, the results of viscosity measurements with monochloroacetic acid obtained by L. M. Katayeva are discussed. Their results may be approximated by the relation $\log \eta = a/T + b$ ($a = 1.1054$, $b = -2.9216$). The authors thank Professor A. S. Predvoditelev, Corresponding Member of the AS USSR, for his interest in this work. There are 4 figures and 12 references: 10 Soviet and 2 British.

ASSOCIATION: Kafedra molekulyarnoy fiziki (Chair of Molecular Physics)

SUBMITTED: November 27, 1959

Card 2/2

PERVUSHIN, I.I.; FILIPPOV, L.P.

Method for ultrasonic velocity measurement in solids and liquids. Akust. zhur. 7 no.3:385-387 '61. (MIRA 14:9)

1. Kafedra molekulyarnoy fiziki Moskovskogo gosudarstvennogo universiteta.

(Ultrasonic waves--Speed)

FILIPPOV, L.P.

Relative methods for measuring the thermal properties of liquids
Inzh.-fiz.zhur. 4 no.11:55-58 N '61. (MIRA 14:10)

1. Gosudarstvennyy universitet im. M.V.Lomonosova, g. Moskva.
(Thermodynamics)

FILIPPOV, L. P.

"the fundamentals of measuring specific heat by the method of surface temperature waves."

Report presented at the Seminar on the Problems of research on thermophysical properties of substances at high temperatures, Novosibirsk, 9-10 April 1963.

FILIPPOV, L.P.

Applying the theory of similitude to the description of the properties of liquids. Part 7. Zhur.fiz.khim. 37 no.1:201-204 Ja '63. (MIRA 17:3)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

ACCESSION NR: AP4024185 S/0294/64/000/001/0003/0008

AUTHORS: Filippov, L. P.; Simonova, Yu. N.

TITLE: Measurement of thermal conductivity of metals at high temperatures. I. Measurement of small differences of high temperatures

SOURCE: Teplofizika vy*sokikh temperatur, no. 1, 1964, 3-8

TOPIC TAGS: thermal conductivity of metal, high temperature thermal conductivity, differential optical pyrometer, micropyrometer, optical wedge, signal to noise ratio, measurement reproducibility

ABSTRACT: A simple differential optical pyrometer is described. It is based on the investigation of the temperature distribution along thin rods, tubes, and wires electrically heated to as much as 2000K, for the purpose of measuring the thermal conductivity of metals. The theory of the micropyrometer is briefly described. The micropyrometer has a sensitivity from 0.02 to 0.08° at temperatures from

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ACCESSION NR: AP4024185

1300 to 2300K. The sensitivity is determined principally by the minimum displacement of the optical wedge necessary to produce a noticeable change in the output signal. The signal to noise ratio is approximately 5×10^{-4} for the entire range of temperatures. The reproducibility of the measurements is within 0.1°, and the equipment is not very sensitive to the focusing of the objectives. A detailed description will be published elsewhere. "We take the opportunity to thank V. A. Zamkov for many consultations which were very useful to us during the initial stage of the work." Orig. art. has: 4 figures, 8 formulas, and 1 table.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet (Moscow State University)

SUBMITTED: 23Jul63 DATE ACQ: 16Apr64 ENCL: 01

SUB CODE: PH, ML NR REF SOV: 003 OTHER: 003

Card 2/3

ACCESSION NR: AP4041067 S/0170/64/000/006/0003/0007

AUTHOR: Filippov, L. P.; Tugareva, N. A.; Markina, L. I.

TITLE: Measurement of small high-temperature pulsations and their utilization for determining the heat capacity of metals

SOURCE: Inzhenerno-fizicheskiy zhurnal, no. 6, 1964, 3-7

TOPIC TAGS: high temperature pulsation, temperature pulsation measurement, photoelectric measurement method, thermionic measurement method, metal heat capacity, heat capacity measurement

ABSTRACT: A photoelectric method of temperature determination is described, and the diagram of a circuit with a photomultiplier for measuring small pulsations of the temperature of an incandescent filament is shown. Formulas for calculating heat capacity are also given. In the experiments, tungsten wire 0.1 mm in diameter was heated with alternating current at 50 cps. The mean temperature of the wire was determined by measuring its resistance with a d-c potentiometer. The temperature pulsations, measured by means of a circuit with a photomultiplier, were reproducible to within 0.5%. Similar results were ob-

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ACCESSION NR: AP4041067

tained by the use of a circuit with a photocell. The maximum error in measuring high-temperature pulsation by the photoelectric method was about 7%. Temperature pulsations on the same object measured by the thermionic-emission and photoelectric methods had a maximum difference of 1.6%, and a mean difference of 0.5%. Although both measurement methods produce almost identical results, the photoelectric method has several advantages; for example, deep vacuum is not required, and the method is suitable for materials with a low thermionic emission and for large objects. In the present study, the data obtained by the photoelectric method were readily applicable in determining the heat capacity of tungsten wire in the 1000—2000C range. Orig. art. has: 1 figure and 8 formulas.

ASSOCIATION: Gosudarstvenny*y universitet im. M. V. Lomonosova, Moscow (Moscow State University)

SUBMITTED: 26Jun63 ATD PRESS: 3064 ENCL: 00

SUB CODE: EM, MM NO REF SOV: 001 OTHER: 005

Card 2/2

!URCHAK, R.P.; FILIPPOV, L.P.

Use of the radial temperature wave method in measuring the thermal diffusivity of metals at high temperatures. Inzh.-fiz. zhur. 7 no.4:84-89 Ap '64. (MIRA 17:4)

1. Gosudarstvennyy universitet imeni Lomonosova, Moskva.

ACCESSION NR: AP4038433 S/0294/64/002/002/0188/0191

AUTHORS: Filippov, L. P.; Simonova, Yu. N.

TITLE: Measurement of thermal conductivity of metals at high temperatures. II. Procedure for thermal conductivity measurements

SOURCE: Teplofizika vy*sokikh temperatur, v. 2, no. 2, 1964, 188-191

TOPIC TAGS: thermal conductivity, pyrometer, temperature detector, metal physical property, temperature gradient, temperature measurement

ABSTRACT: This is a continuation of a paper by the authors (Teplofizika vy*sokikh temperatur v. 1, no. 1, 1964) in which they described a simple differential pyrometer to measure small differences of high temperatures and their distribution over small areas on the object. The present article is devoted to the use of this instrument for the measurement of the thermal conductivity of metals at tempera-

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ACCESSION NR: AP4038433

tures on the order of 2,000° and above. The gist of the method consists of investigating the distribution of the temperature along a wire or a foil heated with current, near a region with constant temperature, i.e., in the region where the temperature distribution is exponential. Although measurements of this type were first performed by Krishnan and Jain (Proc. Roy. Soc. v. A225, 1160, 1954 and Brit. J. Phys. v. 5, no. 12, 426, 1954) this is the first detailed description and analysis of the procedure. An analysis of the heat conduction equations for the foil heated by current in vacuum shows that to determine the temperature distribution it is not necessary to know the absolute values of the temperature differences but their ratios. This permits measurements to be made without calibration of the differential optical pyrometer. The influence of the finite dimensions of the investigated sections of the wire or foil is not decisive, nor is the degree of blackness of the investigated sample. Another advantage of the method is that the change in temperature on the investigated section can be produced artificially by

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ACCESSION NR: AP4038433

means of a wire rider. The procedure proposed was investigated with foil ribbons and wires of tungsten heated in a vacuum chamber. The results were reproducible within 2% and the values of the thermal conductivity obtained under different conditions were accurate within 6%, and agreed fairly well with results obtained by others. It is emphasized that the procedure is simple, sufficiently accurate, and can be readily used at temperatures above 2,000°. Orig. art. has: 1 figure, 6 formulas, and 2 tables.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 23Jul63 DATE ACQ: 09Jun64 ENCL: 00

SUB CODE: TD,MM NR REF SOV: 002 OTHER: 004

Card 3/3

ACCESSION NR: AP4042464 S/0294/64/002/003/0384/0391

AUTHORS: Filippov, L. P.; Pigal'skaya, L. A.

TITLE: Measurement of the thermal diffusivity of metals at high temperatures. 1. Theory of the method of variable heating in a high frequency furnace

SOURCE: Teplofizika vy"sokikh temperatur, v. 2, no. 3, 1964, 384-391

TOPIC TAGS: metal physical property, thermal diffusion, thermal conductivity, high temperature research, induction heating

ABSTRACT: The theory of a new method for measuring the thermal diffusivity of metals at high temperatures was developed. The method consists of detecting periodic changes in the surface temperature of a cylindrical sample heated in a high-frequency induction furnace with periodic variation of the applied voltage. The heating of the sample (caused by the existence of the spin effect) is a surface phenomenon. As a result, radial temperature waves are propagated from the surface toward the axis of the cylinder, and surface temperature oscillations depend on the thermal diffusivity of the material. The solution of the thermal conduction equation $\lambda\nabla^2 T = c\rho\frac{\partial T}{\partial t} - w(r, t)$, where λ, c, and ρ are the

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thermal conductivity, heat capacity, and density of the material, is found under the following assumptions. The length of the circular cylindrical sample is infinite compared to the diameter 2R; the process has continued sufficiently long so that the initial state of the system can be neglected; the temperature oscillation in the sample ϑ is small compared to the constant component of the temperature θ [$\vartheta/\theta \ll 1$] ; and the high frequency field is uniform along the length of the sample. In addition, [the effective thickness of the spin layer, given in MKS units by $\sigma = \frac{1}{\sqrt{\pi\mu\gamma f}}$, where μ and γ are the magnetic permeability and electroconductivity of the sample and f is the carrier frequency of the induction furnace, is assumed small compared with the diameter $\eta = \sigma/2R \ll 1$.]

The rate of heating per unit volume of the sample is harmonic in time

$w(r, t) = \overline{w_0(r)(1 + me^{-i\omega})}$, where m is the modulation coefficient. The distribution of heating in the sample $w_0 = -W \frac{\gamma}{\sqrt{2}R\pi} \times$

has the form [$\times \frac{B_3^2(r\sqrt{2}/\sigma) + B_4^2(r\sqrt{2}/\sigma)}{B_1(R\sqrt{2}/\sigma)B_3(R\sqrt{2}/\sigma) + B_2(R\sqrt{2}/\sigma)B_4(R\sqrt{2}/\sigma)}$]

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where $W = 2\pi \int_0^R w_0(r)\, r\, dr$ is the power released per unit length and the B_i's are expressed through zeroth and first order Bessel functions of the first kind $B_1(x) + iB_2(x) = I_0(\sqrt{i}\,x)$, $B_3(x) + iB_4(x) = \sqrt{i}\, I_1(\sqrt{i}\,x)$. The amplitude and phase of the surface temperature oscillations are then given by $\theta = \frac{Wm}{2\pi\lambda}\psi^\circ(\varkappa)$, where $\psi^\circ(\varkappa) = \sqrt{\frac{B_1^2 + B_2^2}{B_3^2 + B_4^2}}\frac{1}{\varkappa}$, and $\varphi = \operatorname{arc\,tg}\frac{B_1 \cdot B_3 - B_2 \cdot B_3}{B_1 \cdot B_3 + B_2 \cdot B_4}$. The variable $\varkappa = R\sqrt{\frac{\omega}{a}}$, where $a = \lambda / c\rho$ is the thermal diffusivity. Thus, there are two independent methods of determining the thermal diffusivity, neither of which requires knowing the absolute values of the temperature oscillation. The "phase" method requires measuring the phase of the temperature oscillation, i.e., the phase difference between the first harmonic of the changing power output of the induction generator and that of the changing surface temperature of the sample. The "amplitude" method involves measurement of the ratio of surface temperature amplitudes for two different modulation frequencies. For both methods the most favorable experimental conditions are obtained in the region $(\varkappa^2 = 2 \div 6)$. Under these conditions the thermal diffusivity can be

ACCESSION NR: AP4042464

measured with an accuracy of 3-4% by the "phase" method and 3-6% by the "amplitude" method. The effect of finite spin-layer thickness is also discussed. In most cases this results in only minor corrections. The experimental apparatus and operation are described in a second article. Orig. art. has: 63 equations, 2 diagrams, and 3 tables.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 29Dec63 ENCL: 00

SUB CODE: MM, TD NO REF SOV: 003 OTHER: 000

Card 4/4

ACCESSION NR: AP4044522 S/0294/64/002/004/0558/0561

AUTHORS: Pigal'skaya, L. A.; Filippov, L. P.

TITLE: Measuring the temperature conduction of metals at high temperatures. 2. Applying the method of variable heating in a high-frequency oven

SOURCE: Teplofizika vy*sokikh temperatur, v. 2, no. 4, 1964, 558-561

TOPIC TAGS: thermal conductivity, metallography, temperature gradient, harmonic analysis/ MOV 2 vibrator, OMP 019 micropyrometer, MVP 5 induction oven, MPO 2 oscillograph

ABSTRACT: Experiments were performed to measure the temperature conduction of metals by means of recording periodic fluctuations of temperature on the surface of cylindrical metal specimens heated in a high-frequency induction oven. Controlled variables were the amplitude and the phase of the heating unit; for amplitude variation, thermal conductivity was determined through the magnitude of the relative temperature fluctuation at two separate frequencies; for phase variation, the phase difference, the change of temperature and its fluctuation patterns were noted. The experimental apparatus is shown in Fig. 1 on the Enclosure. Here 1 is the test sample (a cylinder 8-20 mm in diameter and 40-80 mm in height, enclosed in a quartz container wherein there is either a vacuum or an inert gas atmosphere);

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ACCESSION NR: AP4044522

2 - high-frequency induction oven MVP-5; 3 - oven-modulating arrangement; 4 - control rectifier; 5 - photomultiplier for receiving radiation; 6 - voltage source; 7 - constant current amplifier; 8 - oscillograph MPO-2 with MOV-2 vibrators. Micropyrometer OMP-019 was used for temperature measurements. The authors explained the manner of calibration and of reading and processing test data. The method was compared with earlier work by the authors (Teplofizika vy*soky*kh temperatur, 2, No. 3, 1964) and with work by V. D. Borisov (Diplomnaya rabota, MGU, 1963). It is concluded that the method described here is preferable, owing to its accuracy, ease of use, and lack of restrictive conditions. Orig. art. has: 3 tables and 2 figures.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 29Dec63 ENCL: 01

SUB CODE: MM NO REF SOV: 003 OTHER: 000

Card 2/3

ACCESSION NR: AP4044522

ENCLOSURE: 01

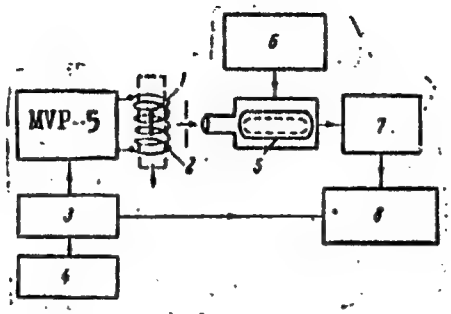

Fig. 1. Schematic drawing of equipment.

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ACCESSION NR: AP4043805 S/0188/64/000/004/0090/0094

AUTHOR: Filippov, L. P.(Member of molecular physics department)

TITLE: Investigations of the thermal properties of solid and liquid metals at high temperatures

SOURCE: Moscow. Universitet. Vestnik. Seriya 3. Fizika, astronomiya, no. 4, 1964, 90-94

TOPIC TAGS: molecular physics, high-temperature metallurgy, heat transfer, Armco iron, liquid metal, solid metal, pyrometer, heat capacity, tungsten, molybdenum, thermal conductivity

ABSTRACT: This is a brief review of work done by staff members of the Molecular Physics Department of the Physics Faculty of Moscow State University in 1962-1963 in the investigation of the thermal properties of solid and liquid metals at high temperatures. Emphasis in this field has been on methods making it possible to work with small objects such as thin wires, metal foil and drops of liquid metal. The use of such objects makes it possible to dispense with unwieldy apparatus and decreases experimentation time. Preference is given to periodic processes. This makes it possible to duplicate experiments easily under the same conditions, yielding a quantity of data greater than obtained when

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ACCESSION NR: AP4043805

other methods are used. In periodic processes the sources of information are: the constant component of temperature, amplitude of the variable component, its phase and its frequency spectrum. Among the methods investigated was the photoelectric recording of temperature variations developing in a wire or foil of a metal during heating by an alternating current. This work was done in 1962 by N. A. Tugareva. A study was made of the reproducibility of the results with variations in all the parameters of the measurement system; the results obtained using two types of photomultipliers were compared and experiments were made using various kinds of light filters and with none at all. Tests of the reproducibility of the data obtained by this method revealed a maximum error of 1.5% and a mean error of 0.5%. This method was used for determining the heat capacity of tungsten in a temperature range from 2000 to 3000K. Another method was used for measurement of heat capacity of both solid and liquid metals. More massive samples are used in this method: metal cylinders or crucibles with liquid metal with diameters of 5-15 mm and a length of several centimeters. Periodic heating of the samples was by electron bombardment. The experiments were made with both external and internal electron heating. In the first case, the sample is placed in a cylindrical tungsten spiral

ACCESSION NR: AP4043805

serving as a cathode and in the second case the cathode is situated in a cavity in the sample. The measurements involve recording the temperature variations in the sample during periodic changes in the intensity of electron bombardment. There was good reproducibility of results in measurements with different periods in a wide range of intensity for samples of different geometry and with cathodes of different types. In the region of temperatures of the order of 1000C the method gives results with an error on the order of 2%. Measurements were made of the heat capacity of Armco iron, tungsten and molybdenum. Another method for measuring the thermal conductivity of metals is the temperature waves method. One of the possible ways of improving this method for high temperatures is to decrease the heat transfer from the lateral surface of the samples by using temperature waves with periods considerably shorter than now used. This method has been employed for measuring the thermal conductivity of Armco iron to a temperature of 900C. A. N. Nurumbetov is now studying the possibility of using a technique in which the butt of the sample is heated periodically by electron bombardment. Another method,, introduced by R. P. Yurchak, uses radial temperature waves. This method is effective in determining the thermal conductivity of poor heat conductors, although it suffers the shortcoming that the amplitude of temperature variations in metal is very small. This difficulty can be overcome and Yurchak has been able to measure the thermal conductivities of metals to temperatures of about 1000C. The method has also been applied to liquid

ACCESSION NR: AP4043805

metals in a cylindrical tantalum crucible. Heating is either from outside or inside the sample, the latter making it easier to obtain large temperature variations. Data have been obtained on liquid and solid tin, lead, cadmium and bismuth. L. A. Pigal'skaya has developed a method for investigating a metal sample in the form of a bar (or thin-walled metal tube with liquid metal) placed along the axis of the magneto of a high-frequency furnace. The method has been used for measurement of the thermal conductivity of tungsten, molybdenum and niobium at temperatures of 1000-2000K. Still another method used at Moscow University is hemispherical temperature waves. In addition, Yu. N. Simonova has investigated the thermal conductivity of thin wires and foil using a special differential pyrometer and has determined the temperature along such objects in the region adjacent to a sector with a constant temperature; the intensity of radiation of these two sectors is measured. The minimum temperature difference which can be recorded reliably is 0.05° at temperatures of about 2000C.

ASSOCIATION: Kafedra molekulyarnoy fiziki Moskovskogo universiteta (Department of Molecular Physics, Moscow University)

Card 4/5

ACCESSION NR: AP4043805

SUBMITTED: 19Mar64 ENCL: 00

SUB CODE: MM, TD NO REF SOV: 012 OTHER: 005

Card 5/5

FILIPPOV, L.P.; SIMONOVA, Yu.N.

Measuring the heat conductivity of metals at high temperatures. Part 2: Methodology of heat conductivity measurements. Teplofiz. vys. temp. 2 no.2:188-191 Mr-Ap '64. (MIRA 17:6)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

PIGAL'SKAYA, L.A.; FILIPPOV, L.P.

Measurement of the thermal diffusivity of metals at high temperatures. Part 2. Use of the method of alternating heating in a high-frequency furnace. Teplofiz. vys. temp. 2 no.4:558-561 Jl-Ag '64. (MIRA 17:9)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

YURCHAK, R.P.; FILIPPOV, L.P.

Measurement of the thermal diffusivity of liquid metals. Teplofiz. vys. temp. 2 no.5:696-704 S-O '64. (MIRA 17:11)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

FILIPPOV, L.P.

Use of the regular regime of the third kind in measuring the thermal properties of solid and liquid metals at high temperatures; review. Teplofiz. vys. temp. 2 no.5:817-828 S-O '64. (MIRA 17:11)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

FILIPPOV, L.P.; TUGAREVA, N.A.; MARKINA, L.I.

Methods for measuring minute fluctuations of high temperatures and their use in determining the heat capacity of metals. Inzh. fiz. zhur. 7 no.6:3-7 '64. (MIRA 17:12)

1. Gosudarstvennyy universitet imeni V.M. Lomonosova, Moskva.

FILIPPOV, L.P.

Study on the thermal properties of solid and liquid metals at high temperatures. Vest. Mosk. un. Ser. 3: Fiz., astron. 19 no.4:90-94 Jl-Ag '64. (MIRA 17:10)

1. Kafedra molekulyarnoy fiziki Moskovskogo universiteta.

[illegible], Yu.A. (Moskva); [illegible], I.I. (Moskva)

Thermal conductivity of tungsten at high temperatures. FMTF no.1:111-[illegible] Ja-F '63. (MIRA 18:3)

L 63108-65 EWT(1)/EPA(s)-2/EWT(m)/EPF(n)-2/EWG(v)/...

ION NR: AP5010477 UR/0294/.../.../.../...

546.81:536.221 + 536.632

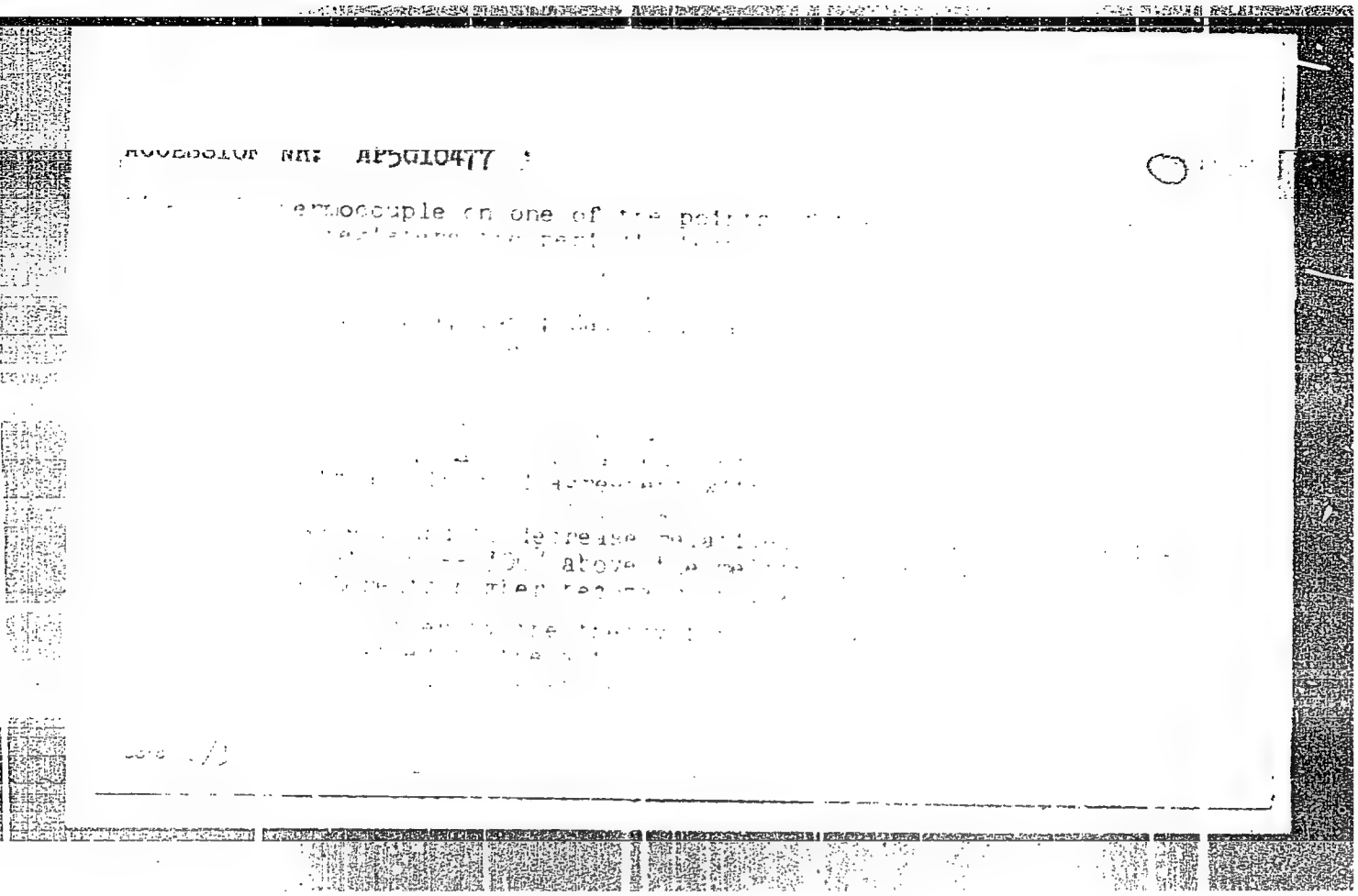
AUTHORS: Yurchak, R. P.; Filippov, L. P.

Thermal properties of liqui...

Teplofizika vysokikh temperatur, ...

TOPIC TAGS: tin, lead, molten metal, thermal ... temperature conductivity, measurement ...

The authors investigated the ...



ACCESSION: AP5010477

article has: 3 figures

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im M V

Card 3/3

L 22466-66 EWT(d)/EWT(m)/EWP(w)/EPF(n)-2/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)/EWP(l) JD

ACC NR: AP6013579 WW/JG SOURCE CODE: UR/0032/65/031/009/1142/1144

AUTHOR: Yurchak, R. P.; Filippov, L. P.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Device for measuring the thermal conductivity of solid and liquid metals

SOURCE: Zavodskaya laboratoriya, v. 31, no. 9, 1965, 1142-1144

TOPIC TAGS: liquid metal, thermal conductivity, metallurgic testing machine, metal, thermocouple, tin, iron

ABSTRACT: The device is based on the use of radial temperature waves. This method has been used to measure the thermal conductivity of poor heat conductors at comparatively low temperatures (up to 300°C).

The essence of the method is as follows. The surface of the investigated body, a long cylinder, is subjected to periodic heating. After a certain time a regular 3rd order regime is set up in this body during which the temperature at each point of the cylinder is altered from one and the same period, independent of initial conditions. The solution to the equation of heat conduction described by this process is solved.

A diagram of the device is presented. Its main parts are a vacuum chamber, heaters, and recording unit. The vacuum in the chamber (approximately 10 mm Hg) is created by the initial vacuum (RVN-280) and diffusion pumps (TsVL-100).

Card 1/2

L 22166-66

ACC NR: AP6013579

To measure thermal conductivity of liquid metals a specimen is placed in a thin-wall tantalum crucible, 2.39 cm in diameter and 12-14 cm long. A system of horizontal baffles prevents convective mixing of the liquid, i.e. possible vertical gradients. The baffles, made of thin tantalum sheet fastened by two molybdenum wires, rigidly fix the position of the thermocouples in the liquid metal. The leads of the thermocouples are found in thin, two-channel ceramic sheathings which are carefully stopped at the bottom by a ceramic cement. The junctions of the thermocouples are in contact with the metal. The sheathings are drawn through the openings in the tantalum baffles. The distance between the thermocouple leads is equal to 1 cm.

The results of measuring the thermal conductivity of tin and iron according to amplitude and phase are presented. The maximum error in the determination of the temperature conductivity by this method is 7%. The device is capable of conducting measurements in the 200-1000°C range. Orig. art. has: 3 figures, 4 formulas, and 1 table. [JPRS]

SUB CODE: 13, 11 / SUBM DATE: none / ORIG REF: 006 / OTH REF: 001

Card 2/2 BK

L 21514-66 EWT(d)/EWT(1)/EWT(m)/EPF(n)-2/EWP(t)/EWA(h) IJP(c) JD/WW/JG
ACC NR: AP6007178 SOURCE CODE: UR/0188/66/000/001/0110/0119

AUTHORS: Filippov, L. P.; Yurchak, R. P.

ORG: Moscow State University, Molecular Physics Department (Moskovskiy gosudarstvennyy universitet, Kafedra molekulyarnoy fiziki)

TITLE: Use of radial temperature waves for joint measurements of thermal properties of solid and liquid metals at high temperatures [Reported and recommended for publication at the All-Union Conference on the Thermophysical Properties of Materials, Odessa, 1964]

SOURCE: Moscow. Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 1, 1966, 110-119

TOPIC TAGS: thermal conduction, thermal diffusion, heat capacity, metal property, temperature measurement, electron bombardment

ABSTRACT: This paper describes the determination of thermal conductivity, thermal diffusivity, and heat capacity of solid and liquid metals at high temperatures by means of radial temperature waves. The method is as follows: The lateral surface

Card 1/2 UDC: 536.212.08

L 21514-66
ACC NR: AP6007178

of a cylinder of the test metal (or a thin-walled metallic crucible with liquid metal) is subjected to electron bombardment, the intensity of which is varied periodically with time. A thermocouple to measure periodic changes in temperature is placed at some point in the sample. Knowledge of the variable components of intensity of electron heating, amplitude of temperature variation, and phase difference between oscillations of heat input and temperature is sufficient to determine the desired thermal properties. Either internal or external heating may be used. Basic formulas are presented and modified to meet the conditions of the experiments and to supply specific solutions to evaluate the thermal properties. Tests were made on iron and liquid lead with results corresponding very closely to values obtained from the literature for the two metals. Orig. art. has: 2 figures, 4 tables, and 24 formulas. [04]

SUB CODE: 20/ SUBM DATE: 03Nov64/ ORIG REF: 005/ OTH REF: 002
ATD PRESS: 4222

Card 2/2 dda

L 34125-66 EWT(m)/EWP(t)/ETI IJP(c) JD/WW/JW/JG

ACC NR: AP6008836 (A) SOURCE CODE: UR/0294/66/004/001/0144/0147

AUTHOR: Pigal'skaya, L. A.; Yurchak, R. P.; Makarenko, I. N.; Filippov, L. P.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Thermal properties of molybdenum at high temperatures

SOURCE: Teplofizika vysokikh temperatur, v. 4, no. 1, 1966, 144-147

TOPIC TAGS: molybdenum, metal physical property, heat conductivity, high temperature effect

ABSTRACT: This paper is devoted to the results of the measurement of the thermal conductivity and specific heat of molybdenum at high temperatures (1000—2000K), and to the values of heat conductivity obtained from the results. This work is part of the program of investigations of the thermal properties of solid and liquid metals being conducted at the Chair of Molecular Physics, Physics Department, MGU (kafedra molekulyarnoy fiziki fizicheskogo fakul'teta MGU). The experimental set-up, the methods used, and the specimens are described. The values of the heat conductivity of molybdenum and density are presented in graphs together with the data of other authors. The values of the Lorentz number, determined from the heat conductivity values, monotonically decreasing with a rise in temperature from $3.17 \cdot 10^{-8}$ at 1000K to $2.88 \cdot 10^{-8}$ v/deg^2 at 2000K. The appreciable difference of the Lorentz number from the theoretical value $2.45 \cdot 10^{-8}$ v/deg^2 testifies to the presence in the molybdenum of a considerable lattice heat conductivity, amounting to about 15—20% of the electronic. The absolute value of the lattice heat conductivity decreases with a rise in temperature as 1/T

Card 1/2 UDC 546.77:536.631 + 536.2.023

L 34125-66

ACC NR: AP6008836

($\lambda_{latt} \approx 320/T$ w/cm·deg), which agrees with the predictions of the theory. Orig. art. has: 3 figures.

SUB CODE: 11 / SUBM DATE: 27Jul64 / ORIG REF: 011 / OTH REF: 004

Card 2/2

L 33659-66 EWT(l)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/WW/JG

ACC NR: AP6014081 SOURCE CODE: UR/0294/66/004/002/0293/0295

AUTHOR: Pigal'skaya, L. A.; Filippov, L. P.; Borisov, V. D.

79
B

ORG: Moscow State University im. M. V. Lomonosov (Moscovskiy gosudarstvennyy universitet)

TITLE: The heat conductivity of tungsten at high temperatures

SOURCE: Teplofizika vysokikh temperatur, v. 4, no. 2, 1966, 293-295

TOPIC TAGS: heat conductivity, tungsten, high temperature metal

ABSTRACT: A tungsten rod with a diameter of 10 mm and a length of 80 mm was used for the experiments. Control measurements were made with a rod of smaller length-- 60 mm. The sample (a forged ingot) contained 99.95% tungsten, with a 0.035% molybdenum impurity; its density at room temperature was 19.17 gram/cm^2. At a temperature of 2000°K the experimental data were approximately 11% higher than data given in the literature. A table gives results of measurements of thermal diffusivity which were made to determine heat conductivity. A second table gives values of the heat conductivity of tungsten determined experimentally with the data of other authors. Measurements, made in a comparatively narrow temperature interval, yielded values for the heat

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L 33659-66

ACC NR: AP6014081

capacity of tungsten which differed by an average of 0.7% from the data of other authors. Curves are given which show the thermal diffusivity of tungsten as a function of temperature and the heat conductivity of tungsten as a function of temperature. Orig. art. has: 2 figures and 1 table.

SUB CODE: 11, 20/ SUBM DATE: 08Sep64/ ORIG REF: 008/ OTH REF: 003

Card 2/2 mc

FILIPPOV, L.S.

Technical specifications mirror the machine tool. Mashinostroitel' no.1:41 Ja '63. (MIRA 16:2)

(Machine tools—Design)

FILIPPOV, M.

Effective magnetic permeability of a suspended ferromagnetic layer [with summary in English]. Vestis Latv ak no.12:52-54 '61.

1. Akademiya nauk Latviyskoy SSR, Institut fiziki

FILIPPOV, M.

Pseudofluidization of a suspended magnitite layer in a magnetic field [with summary in English]. Vestis Latv ak no.1:69-73 '62.

1. AN Latviyskoy SSR, Institut fiziki

EWT(d)/EPA(s)-2/EWT(m)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(b)/EWP(b)/
Pf-4 JD/HM
ACCESSION NR: AP5010894 UR/0286/65/000/007/0082/0083

AUTHORS: Slavin, G. A.; Gusev, A. T.; Korotkova, G. M.; Filippov, B. A.; Petrov, A. V.

TITLE: Device for welding with a pulsed arc. Class 21, No. 164716

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 7, 1965, 82-83

TOPIC TAGS: welding equipment, arc welding

ABSTRACT: This Author Certificate presents a device for welding with a pulsed ... taining an oscillator and a source of a pulsed operating arc and is provided with a welding transformer and a chopper, e.g., a thyratron. To increase the quality of the welded joint, a regulated supply of the on-duty arc is used, e.g., containing a transformer, a rectifier, and a potentiometer. The supply is ... the welding electrodes in parallel with the pulsed arc source (see ... enclosure). To improve the pulse shape of ... current, the ... arc source is provided with a four-... choke. The ... of this choke is made of two win... [illegible]

Card 1/3

L 45404-65

ACCESSION NR: AP5010894

Feedback is connected in series in the electrode-product circuit. Orig. art. has: 1 diagram.

ASSOCIATION: none

SUBMITTED: 18Jul62 ENCL: 01 SUB CODE: IE, MM

NO REF SOV: 000 OTHER: 000

L 15199-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b) MJW/JD/MW

ACC NR: AP6002669 SOURCE CODE: UR/0126/65/020/006/0881/0888

AUTHOR: Filippov, M. A.; Bogachev, I. N.

ORG: Ural Polytechnic Institute im. S.M. Kirov (Ural'skiy politekhnicheskiy institut)

TITLE: Formation of deformation martensite in austenitic steels under conditions of explosive forming

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 6, 1965, 881-888

TOPIC TAGS: steel, austenitic steel, nickel steel, manganese steel, steel strengthening, explosive strengthening

ABSTRACT: Small specimens (30 x 30 x 6 mm) of austenitic steels 40N25 (0.42% carbon and 24.98% nickel) and 40G13 (0.41% carbon and 13.62% manganese) were austenitized at 1050C and water quenched. Small (1.5 g) charges of a powerful explosive were detonated on the surface of the specimens, which rested on a heavy austenitic-steel plate. The explosion formed small, round craters about 1.8 mm deep on the specimen surfaces and caused a sharp increase of microhardness in the zones adjacent to craters: up to 850 kg/mm^2 in 40G13 steel and 600 kg/mm^2 in 40N25 steel, compared to the respective initial microhardness of 210 and 180 kg/mm^2. Microscopic examination and x-ray diffraction patterns showed that in both steels, over 70% of austenite in the zones adjoining the craters was transformed to martensite; but the distribution of martensite

Card 1/3 UDC: 669.15;548.53

L 15199-66

ACC NR: AF6002669

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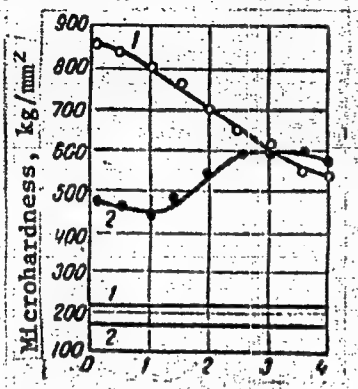
and, consequently, of microhardness along the depth of the zone followed a different pattern in each steel. In the 40G13 the maximum microhardness and the maximum amount of martensite was observed at the bottom of the crater (see Fig. 1), and in 40N25,



Distance from crater edge, mm

Fig. 1. Microhardness of 40G13 (1) and 40N25 (2) steels depending on the distance from the crater edge. Horizontal lines show initial microhardness

at a distance of 3 mm from the bottom. It is noted that the mechanism of martensite transformation and the structure of martensite formed under the effect of an explo-

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L 15199-65
ACC NR: AP6002669

sion are similar to those observed at cooling well below the martensite point. The intensive strengthening of both steels, which could not be attained by other strengthening methods, results not only from martensite, but also from the strain hardening of austenite due partly to shock waves and partly to strain caused by martensitic transformation. Orig. art. has: 4 figures. [DV]

SUB CODE: 11, 13/ SUBM DATE: 20Jul64/ ORIG REF: 009/ OTH REF: 008/ ATD PRESS: 4189

Card 3/3

SLAVIN, G.A. (Moskva); PETROV, A.V. (Moskva); KOROTKOVA, G.M. (Rzhev); FILIPPOV, M.A. (Rzhev)

Feed source of a direct current pulsation arc. Avtom.svar. 18 no.11:63-67 N '65. (MIRA 18:12)

1. Submitted April 29, 1965.

L 26667-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t) IJP(c) JD

ACC NR: AP6010413 SOURCE CODE: UR/0126/66/021/003/0472/0474

AUTHORS: Bogachev, I. N.; Filippov, M. A.; Potekhin, B. A. 46 B

ORG: Ural Polytechnic Institute im. S. M. Kirov (Ural'skiy politekhnicheskiy institut)

TITLE: Investigation of plasticity of several austenitic steels subject to high velocity loads 18 19

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 3, 1966, 472-474

TOPIC TAGS: steel, austenitic steel, martensite / N28 steel, 40N25 steel, 2Kh18N9 steel, 67Kh7N7 steel, 30Kh10G10 steel, 47Kh10G8 steel

ABSTRACT: The plasticity and onset of martensite rearrangement during dynamic and static elongation of the steels N28, 40N25, 2Kh18N9, 67Kh7N7, 30Kh10G10, and 47Kh10G8 was determined. The experimental procedure followed that described by G. M. Kraft (Response of Metals to High Velocity Deformation, ASM, N.Y., 1961). The fraction of martensite in the specimens after deformation was determined by a ballistic magnetometer. The experimental results are tabulated. It was found that maximum increase in plasticity during dynamic elongation occurs for those steels which show the largest increase in martensite conversion. The rate of propagation of plastic deformation in nonreinforced steels in the initial stages of deformation is determined by the rate of martensite conversion. Orig. art. has: 2 tables.

SUB CODE: 11,20/ SUBM DATE: 02Jun65/ ORIG REF: 004/ OTH REF: 001

Card 1/1 UDC: 534.222.2:620.172.22+669.15-194

L 26711-66 EWT(d)/FBD/EWT(l)/EWP(e)/EWT(m)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c)

ACC NR: AP6015443 WG/WH SOURCE CODE: UR/0051/66/020/005/0921/0923

AUTHOR: Pokrovskiy, A. G.; Filippova, M. A.

ORG: none

TITLE: A theoretical study of controlling ruby laser generation by means of a modulated traveling ultrasonic wave diffraction modulator

SOURCE: Optika i spektroskopiya, v. 20, no. 5, 1966, 921-923

TOPIC TAGS: laser, solid state laser, ruby, coherent light, light modulation diffraction, modulator

ABSTRACT: A theoretical analysis is conducted of experiments described elsewhere (Optika i spektrokopiya, v. 20, no. 5, 1966, 924) in which a laser beam was modulated by an ultrasonic wave in a diffraction modulator placed between the ruby laser rod and the external mirror of an interferometer. Using a computer, the authors calculated the emission intensity, population inversion, and beam attenuation from a ruby laser modulated by ultrasonic waves for the cases of sinusoidal and square modulation frequencies. The results obtained are in good agreement with the experimental data, i.e., it was shown that the pulse should consist of a regular sequence of pulsation packets. The number of relaxations per packet should decrease with increasing

Card 1/2 UDC: 621.375.9:535+534.321.9

L 26711-66

ACC NR: AP6015443

modulation frequency until at some high frequency some packets will not be generated. [CS]
Orig. art. has: 3 formulas and 3 figures.

SUB CODE: 20/ SUBM DATE: 18Feb65/ ORIG REF: 001/ OTH REF: 003/ ATD PRESS: 4258

Card 2/2

66535

2/,2/00

SOV/144-59-1-15/21

AUTHOR: Filippov, M.F., Cand.Tech.Sci., Docent

TITLE: The Dependence of the Radius of the Equilibrium Orbit of Accelerated Electrons on the Dimensions and Parameters of the Gap Space of a Betatron Electromagnet

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika, 1959, Nr 1, pp 114-120 (USSR)

ABSTRACT: Accurate calculations of the pole piece profiles and the dimensions of the gap of a betatron electromagnet, as well as accuracy in manufacture and assembly of the sections of the magnetic circuit, do not necessarily ensure the coincidence between the calculated and the actual electron orbit radii. The latter can usually be adjusted by altering the distance between the pole pieces or by changing the dimensions of the central discs. In spite of sufficiently accurate adjustments, the orbit radius may change towards the end of the accelerating process because of saturation of sections of the magnetic circuit and also because of phase differences between the control field and the accelerating field. The present article offers a theory of the dependence of the equilibrium stable orbit on the parameters of the magnet

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66535

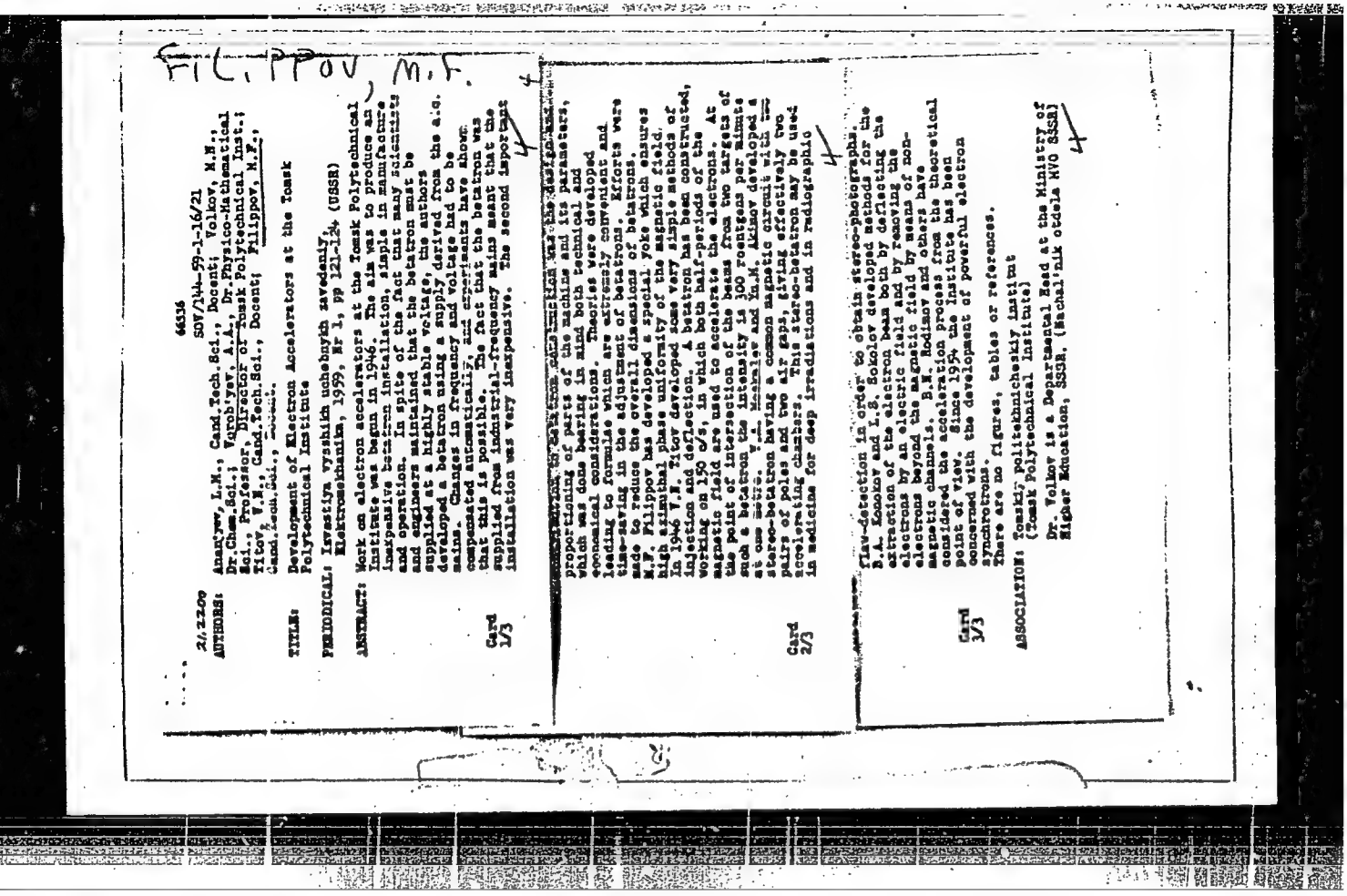
SOV/144-59-1-15/21

The Dependence of the Radius of the Equilibrium Orbit of Accelerated Electrons on the Dimensions and Parameters of the Gap Space of a Betatron Electromagnet

gap. An equation is derived (Eq 8) which may be used to estimate tolerances in the dimensions of the magnetic circuit and to calculate the maximum energy possible in a given betatron. The effect of the gap on the field index n and the effect of changes in the gap distance on the radius of the equilibrium orbit are investigated in some detail. Eq (16) is derived to estimate the amount by which the distance between the pole pieces must be adjusted in order that the calculated and the actual orbit should coincide, assuming that the difference between the calculated and measured radii is known.
There are 1 figure and 5 Soviet references.

ASSOCIATION: Tomskiy politekhnicheskiy institut
(Tomsk Polytechnical Institute)

Card 2/2



FIL'POV, M.F.

66336
SOV/144-59-1-16/21

AUTHORS: Anan'yev, L.M., Cand.Tech.Sci., Docent; Volkov, M.M., Dr.Chem.Sci.; Vybiyan, A.A., Dr.Physico-Mathematical Sci., Professor, Director of Tomsk Polytechnical Inst.; Titov, V.M., Cand.Tech.Sci., Docent; Filippov, M.F., Cand.Tech.Sci., Docent

TITLE: Development of Electron Accelerators at the Tomsk Polytechnical Institute

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Elektromekhanika, 1959, Nr 1, pp 121-124 (USSR)

ABSTRACT: Work on electron accelerators at the Tomsk Polytechnical Institute was begun in 1946. The aim was to produce an inexpensive betatron installation, simple in manufacture and operation. In spite of the fact that many scientists and engineers maintained that the betatron must be supplied at a highly stable voltage, the authors developed a betatron using a supply derived from the a.c. mains. Changes in frequency and voltage had to be compensated automatically, and experiments have shown that this is possible. The fact that the betatron was supplied from industrial-frequency mains meant that the installation was very inexpensive. The second important

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proportioning of parts of the machine and its parameters, which was done bearing in mind both technical and economical considerations. Theories were developed leading to formulae which are extremely convenient and time-saving in the adjustment of betatrons. Efforts were made to reduce the overall dimensions of betatrons. M.F. Filippov has developed a special yoke which ensures high azimuthal phase uniformity of the magnetic field. In 1946 T.P. Tiar developed some very simple methods of injection and deflection. A betatron has been constructed, working on 150 o/s, in which both half-periods of the magnetic field are used to accelerate the electrons. At the point of intersection of the beams from two targets of such a betatron the intensity is 300 roentgens per minute at one metre. V.I. Kuznetsov and Yu.M. Arkhov developed a stereo-betatron having a common magnetic circuit with two pairs of poles and two air gaps, giving effectively two accelerating chambers. This stereo-betatron may be used in medicine for deep irradiations and in radiographic

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flaw-detection in order to obtain stereo-photographs. B.A. Kononov and I.S. Sokolov developed methods for the extraction of the electron beam both by deflecting the electrons by an electric field and by removing the electrons beyond the magnetic field by means of non-magnetic channels. B.M. Rodionov and others have considered the acceleration process from the theoretical point of view. Since 1954 the Institute has been concerned with the development of powerful electron synchrotrons.
There are no figures, tables or references.

Card 3/3

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

Dr. Volkov is a Departmental Head at the Ministry of Higher Education, SSSR. (Machine translated)

68137

21.2300 SOV/144-59-2-19/19

AUTHOR: Filippov, M. F., Candidate of Technical Sciences, Docent, Dean.

TITLE: A Betatron with a Symmetric Magnetic Field

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika, 1959, Nr 2, pp 131-134 (USSR)

ABSTRACT: The electromagnet is shown schematically in Fig 2 and produces a magnetic field with a high degree of axial symmetry. It has a ring-shaped air gap in the yoke. A list of the electromagnet parameters is given in Table 1 in which the parameters for the electromagnet shown in Fig 2 are compared with the more usual Ш-shaped electromagnet shown in Fig 1. The high azimuthal uniformity of the field ensures an increase in the intensity of the gamma-radiation. The problem is being studied using a 15 MeV betatron.
There are 2 figures and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy fakul'tet, Tomskiy politekhnicheskiy institut (Physics-Engineering Faculty, Tomsk Polytechnical Institute)

Card 1/1

S/139/59/000/05/007/026
E032/E114

AUTHORS: Moskalev, V.A., Filippov, M.F., Skorikov, A.G., and Skvortsov, Yu.M.

TITLE: A High Pulsed Current Stereobetatron /1

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1959, Nr 5, pp 35-44 (USSR)

ABSTRACT: The Tomsk Polytechnical Institute has designed a 25 MeV stereobetatron such that the beam current at the target is of the order of a few amps during a fraction of a microsecond. The shape of the magnetic field was based on the theoretical studies reported in Refs 3-7. The present paper gives a general description of the various features of the betatron including the construction of the electromagnet, the supplies, the injection scheme, the extraction scheme, and the design of the two independent vacuum systems. The machine is now being built. It will be used to study electron interactions in the two crossed beams. There are 10 figures and 14 references, of which 12 are Soviet and 2 English.

Card 1/1

ASSOCIATION: Tomskiy politekhnicheskiy institut im. S.M. Kirova

SUBMITTED: December 27, 1958

[illegible], L. ; [illegible]EV, V.A.; FILIPOV, M.F.; [illegible], S.A.

International Colloquium on Betatrons. Atom. energ. 18 no.2: 192-193 F '65. (MIRA 18:3)

FILIPPOV, M. F. Eng.

"Automatization of Control Units in Central Heating Plants," Zhil. kom. khoz., 2, No.8, 1952

1. FILIPPOV, M. F., Eng.

2. USSR (600)

4. Hot Water Heating

7. Heating tall buildings. Gor.khoz.Mosk. 26 no. 11 1952

9. Monthly List of Russian Accessions, Library of Congress, February 1953, Unclassified.

FILIPPOV, M. F.

GROMOV, N. K. - LUK'YANOV, V. I. - FILIPOV, M. F.

Moscow - Heating from Central Stations

Practical systems for district heat supply in Moscow.
Gor. khoz. Mosk. no. 1, 1953

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

SOV/112-59-1-346

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1959, Nr 1, p 47 (USSR)

AUTHOR: Filippov, M. E.

TITLE: Designing and Building an All-Metal Underwater Siphon Tunnel for Heat Pipelines

PERIODICAL: Tr. Nauchno-tekhn. soveshchaniya po proyektir. i str-vu teplovykh setey. M.-L., Gosenergoizdat, 1956, pp 140-151

ABSTRACT: A 180-m long all-metal welded tunnel was constructed and laid on the bottom of the Moscow River for transmitting heat from the Mosenergo #12 station. The tunnel weighs 160 t; it is loaded against emersion with cast-iron semi-rings. The passageway-type tunnel equipped with forced-and-draft ventilation and electric lighting houses 6 heat lines (2x500, 2x400, and 2x150 mm). A system of suspension supports in an inclined tunnel section is described, as is a method of setting the tunnel units afloat and of submersing the tunnel on the river bottom. A 10-m wide trench was excavated to a depth

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SOV/112-59-1-346

Designing and Building an All-Metal Underwater Siphon Tunnel for Heat Pipelines

of 7.5 m below the water surface. Navigation was stopped for only 10 hours during tunnel submersion. Tunnel inspection revealed its complete water-tightness. Three years of subsequent operation have confirmed the correctness of design and good constructional qualities of the structure.

M.L.Z.

Card 2/2

FILIPPOV, M.F., inzh.

Selecting circuits for heating pipes inside and outside of cities.
Elek.sta. 28 no.12:32-34 D '57. (MIRA 12:3)
(Heat engineering)

FILIPPOV, M.F.

The KS-400 cathode station. Biul.tekh.-ekon.inform. no.12:38-40 '58. (MIRA 11:12)
(Electric cables--Maintenance and repair)

FILIPPOV, M.F.

Schemes for the connection of heating, ventilation, and hot water-supply systems of buildings to double-pipe heating networks. Vod. i san. tekh. no. 12:1-7 D '60. (MIRA 14:4)
(Heating from central stations)

L'VAMIN, A.A., inzh.; FILIPPOV, M.F., inzh.; DAVIDYANTS, N.M., inzh.

Use of precast reinforced concrete in the construction of heat-supply networks. Vod. i san. tekh. no.6:25-28 Je '62. (MIRA 15:7)
(Pipe, Concrete)
(Precast concrete construction)

FILIPPOV, M.F., inzh.

Estimated temperature of the heat carrier of a closed 2-pipe heating system. Vod. i san. tekh. no.7:17-23 Jl '65.

(MIRA 18:8)

29074

Kyezhopyeratsionnyy Transport Pri Pyeryemyenno-Potochnom Myetodye Proizvodstva. Stanki I Instrumyent, 1949, No 9, C. 15-16.

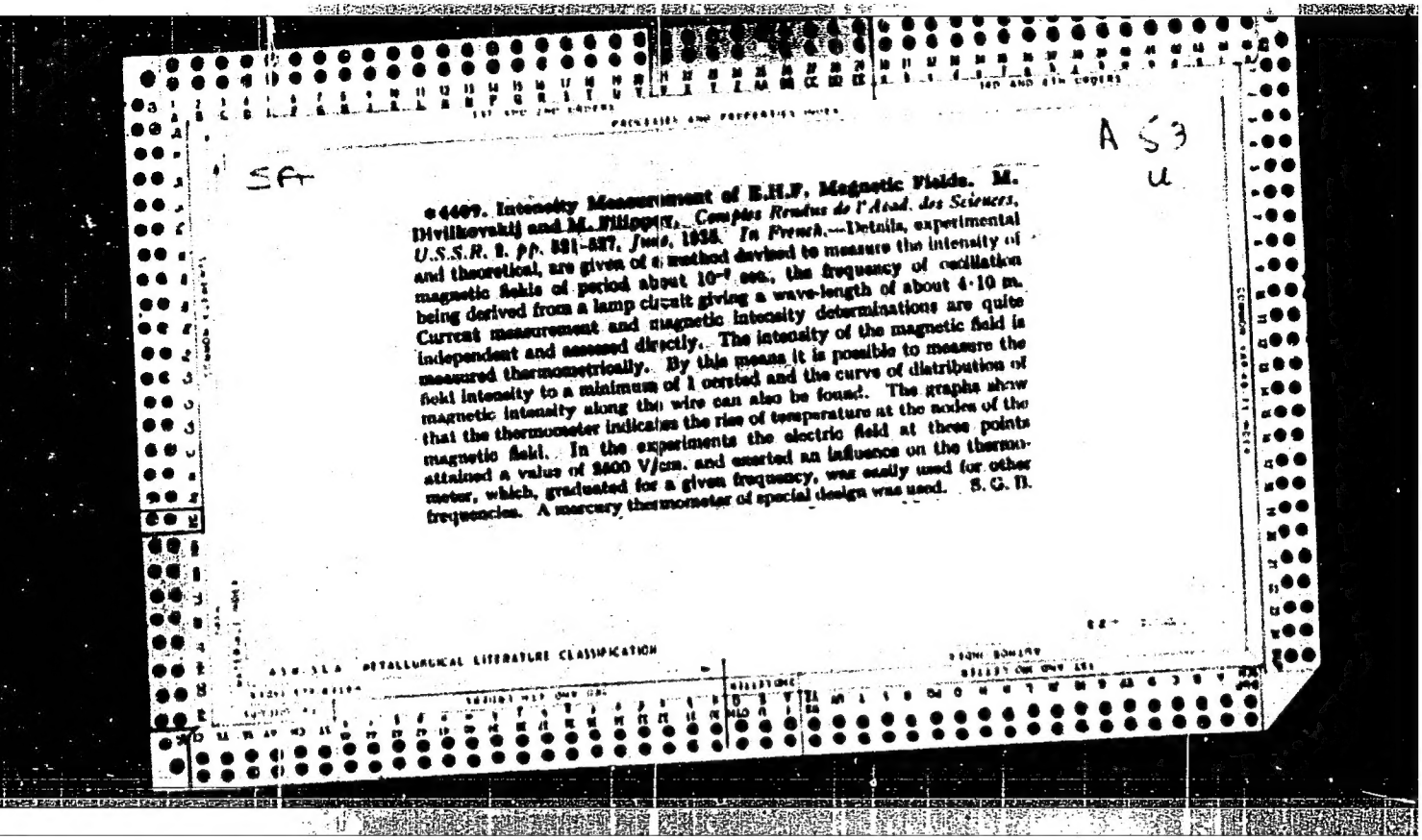
8. Mashinovyedyeniye.
Mashinostroyeniye
Priborostroyeniye
(Spyetsial'noye Mashinostroyeniyesm. Po Soutvyetstvuyushchim Spyets. Raedyelam)
A. Obshchiye Voprosy

SO: LETOPIS' No. 34

FILIPPOV, M. I., VERKHOVSKIY, G. Ya.

"Case of Successful Treatment of a Tubercular Lupus Vulgaris of the Larynx with Vitamin D_2," Vest. Oto-rino-laringol., No. 4, 1949.

Chair Dermato-Venereal Diseases, and Chair of Otorhinolaryngology, Yaroslavl' Med. Inst.



A S3
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*4469. **Intensity Measurement of E.H.F. Magnetic Fields.** M. Divilkovskij and M. Filippov. *Comptes Rendus de l'Acad. des Sciences, U.S.S.R.* 2. pp. 821–827. *June*, 1935. *In French.*—Details, experimental and theoretical, are given of a method devised to measure the intensity of magnetic fields of period about 10^{-7} sec., the frequency of oscillation being derived from a lamp circuit giving a wave-length of about 4·10 m. Current measurement and magnetic intensity determinations are quite independent and assessed directly. The intensity of the magnetic field is measured thermometrically. By this means it is possible to measure the field intensity to a minimum of 1 oersted and the curve of distribution of magnetic intensity along the wire can also be found. The graphs show that the thermometer indicates the rise of temperature at the nodes of the magnetic field. In the experiments the electric field at these points attained a value of 2600 V/cm. and exerted an influence on the thermometer, which, graduated for a given frequency, was easily used for other frequencies. A mercury thermometer of special design was used. S. G. B.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

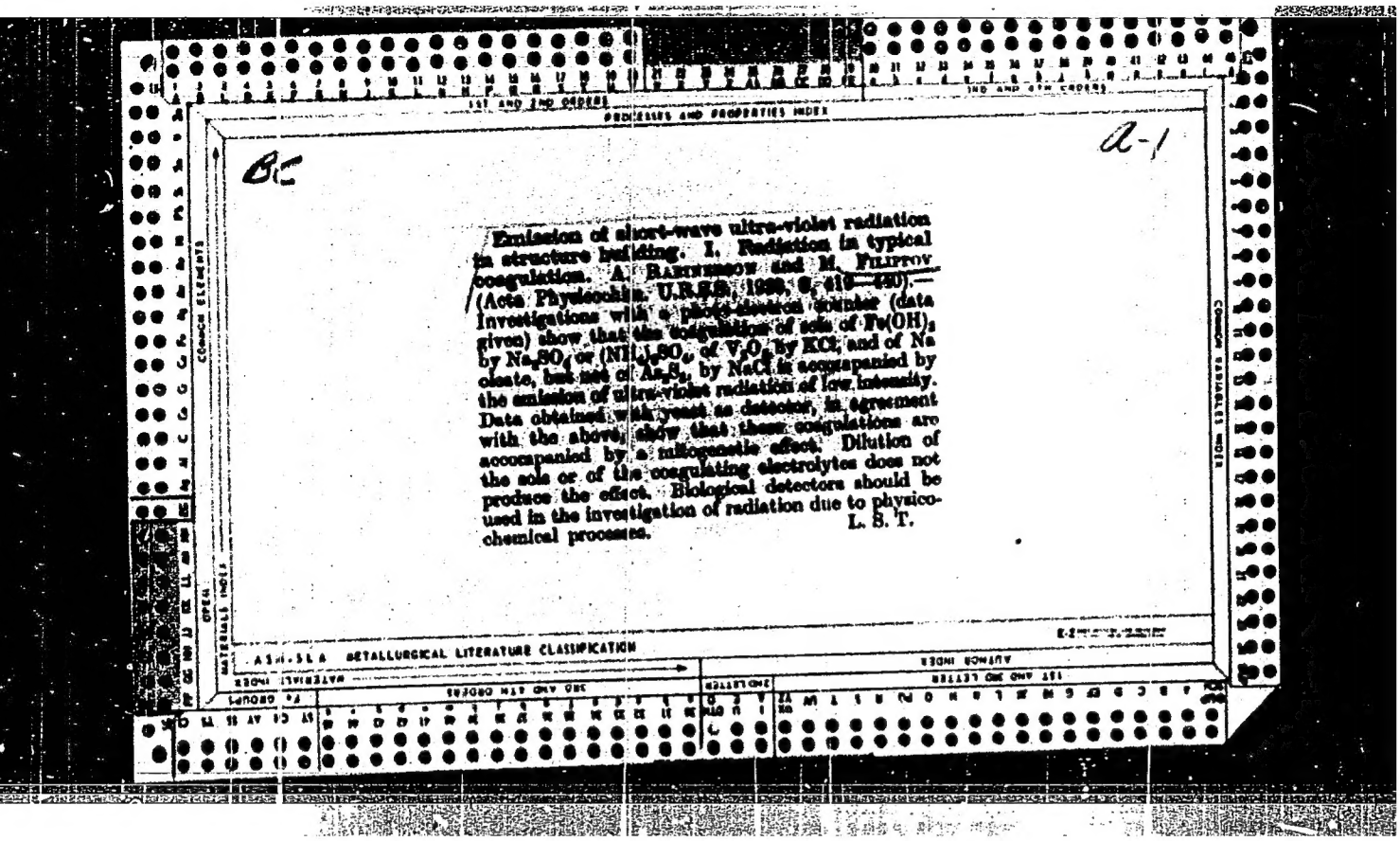
PROCESSES AND PROPERTIES INDEX

EC

a-1

Dielectric losses at high frequency in liquids. M. Dvinikovski and M. Erzinov (Physikal. Z. Sovietunion, 1935, 8, 311—318).—The dielectric losses in EtOH, Pr$^{\alpha}$OH, and glycerol have been obtained by determination of the expansion of the liquid in a thermometer vessel when placed in a high-frequency electric field. No rise of temp. could be observed in the case of C_6H_6. R. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

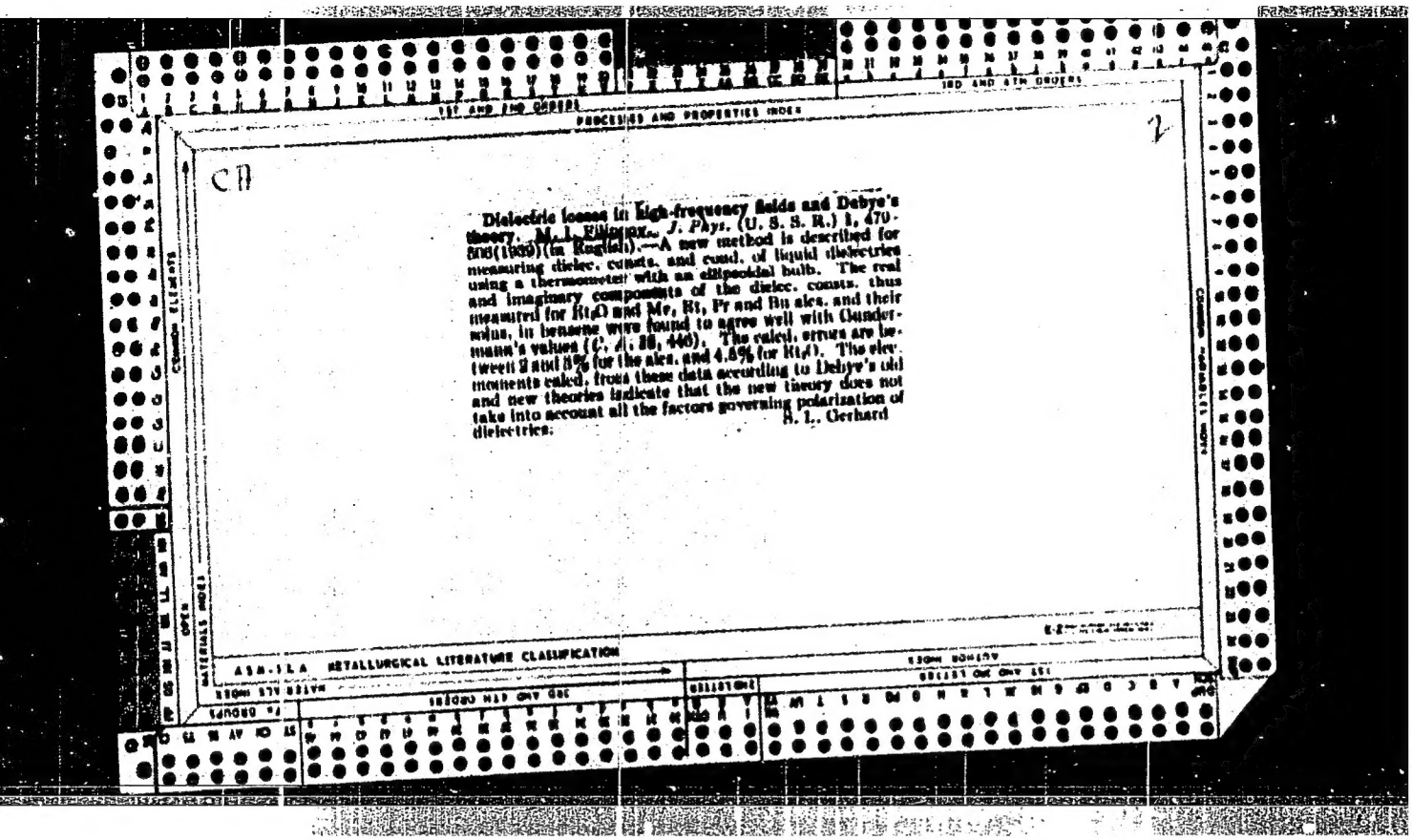


B-

A-1

Emission of short-wave ultra-violet radiation in structure building. I. Radiation in typical coagulation. A. Rabinowitsch and M. Filippov (Acta Physicochim. U.R.S.S., 1938, 8, 415—430).—Investigations with a photo-electron counter (data given) show that the coagulation of sols of $Fe(OH)_3$ by Na_2SO_4 or $(NH_4)_2SO_4$, of V_2O_5 by KCl, and of As_2S_3 by NaCl is accompanied by the emission of ultra-violet radiation of low intensity. Data obtained with yeast as detector, in agreement with the above, show that these coagulations are accompanied by a mutagenetic effect. Dilution of the sols or of the coagulating electrolytes does not produce the effect. Biological detectors should be used in the investigation of radiation due to physico-chemical processes.

L. S. T.



Dielectric losses in high-frequency fields and Debye's theory. M. I. Elinson. *J. Phys.* (U. S. S. R.) 1, 479-505(1939)(in English).—A new method is described for measuring dielec. consts. and cond. of liquid dielectrics using a thermometer with an ellipsoidal bulb. The real and imaginary components of the dielec. consts. thus measured for $RtCl_4$ and Me, Et, Pr and Bu alcs. and their mixts. in benzene were found to agree well with Gunder-mann's values (*C. A.* 28, 446). The calcd. errors are between 2 and 8% for the alcs. and 4.5% for $RtCl_4$. The elec. moments calcd. from these data according to Debye's old and new theories indicate that the new theory does not take into account all the factors governing polarization of dielectrics. R. L. Gerhard